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Gamma-Ray Pulsars

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The Fermi Gamma-Ray Space Telescope has revolutionized the study of pulsar physics with the detection of over 80 gamma-ray pulsars. Several new populations have been discovered, including 24 radio quiet pulsars found through gamma-ray pulsations alone and about 20 millisecond gamma-ray pulsars. The gamma-ray pulsations from millisecond pulsars were discovered by both folding at periods of known radio millisecond pulsars or by detecting them as gamma-ray sources that are followed up by radio pulsar searches. The second method has resulted in a phenomenally successful synergy, with ~35 new radio MSPs (to date) having been discovered at Fermi unidentified source locations and the gamma-ray pulsations having then been detected in a number of these using the radio timing solutions. The higher sensitivity and larger energy range of the Fermi Large Area Telescope has produced detailed energy-dependent light curves and phase-resolved spectroscopy on brighter pulsars, that have ruled out polar cap models as the major source of the emission in favor of outer magnetosphere accelerators. The large number of gamma-ray pulsars now allows for the first time meaningful population and sub-population studies that are revealing surprising properties of these fascinating sources.